



Fig. 1

BACKGROUND ART

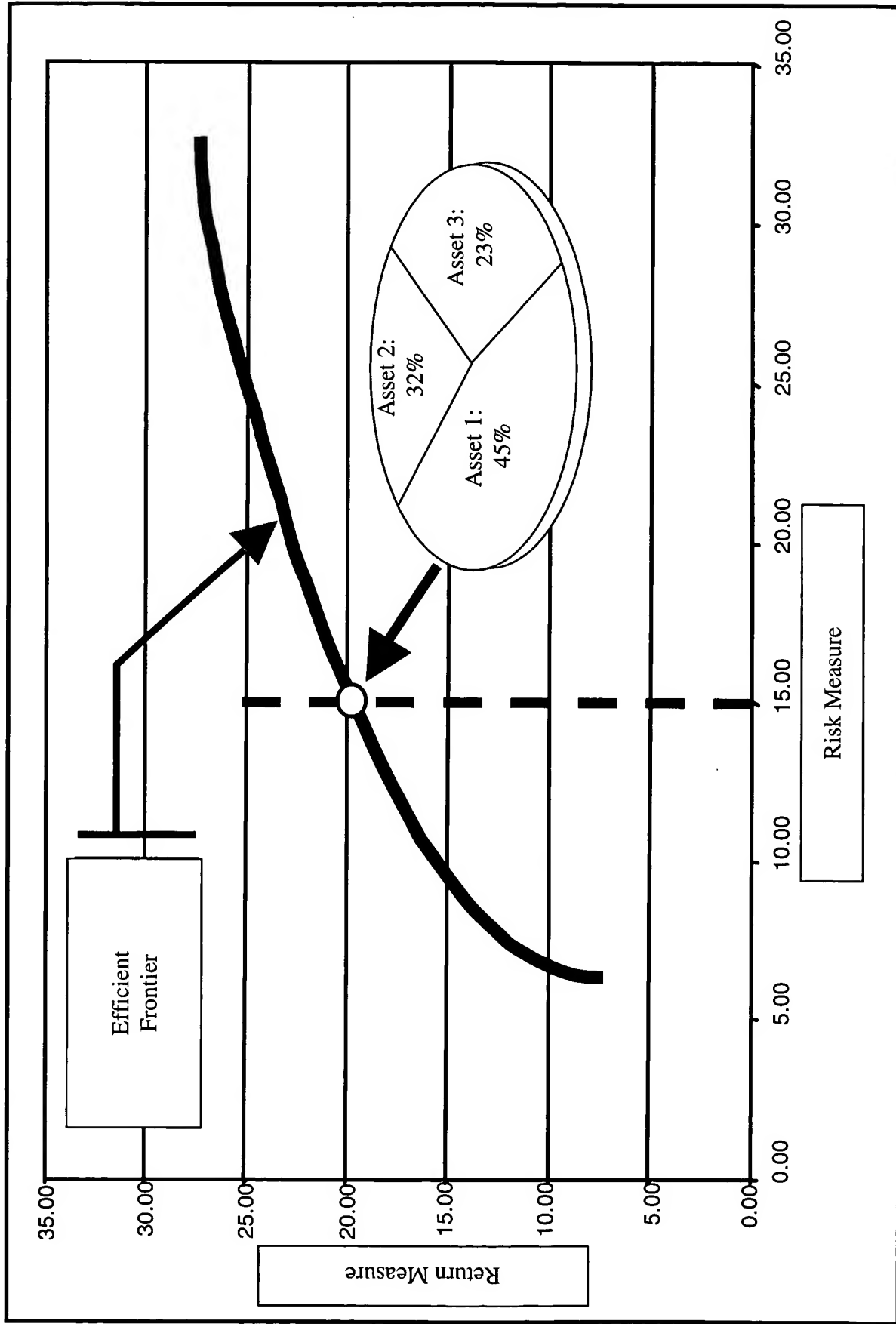


Fig. 4

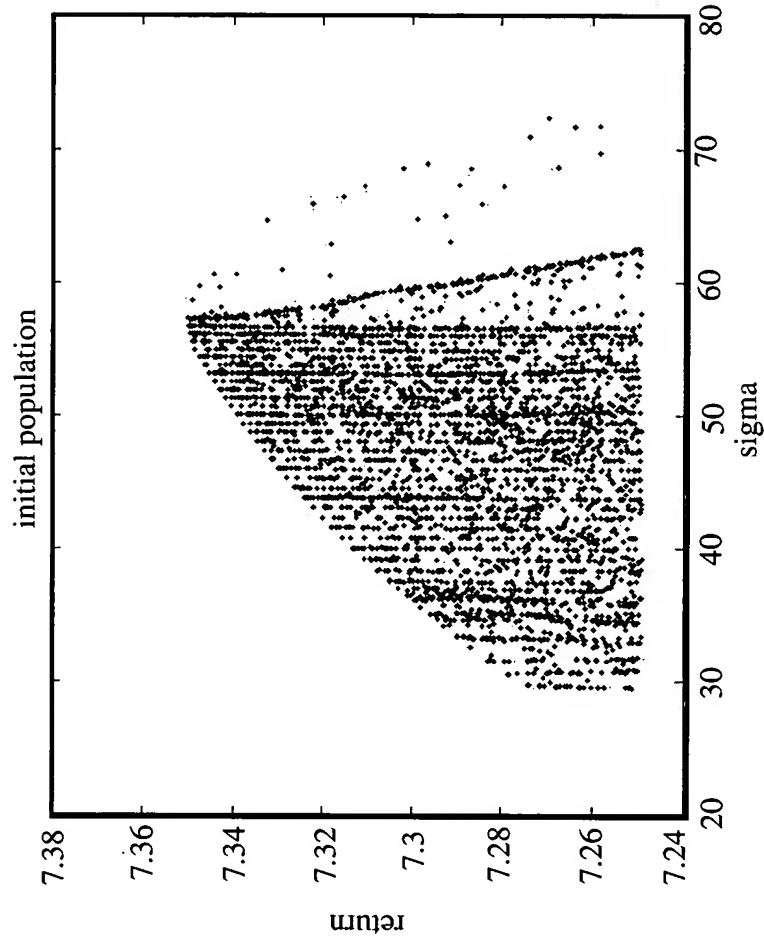
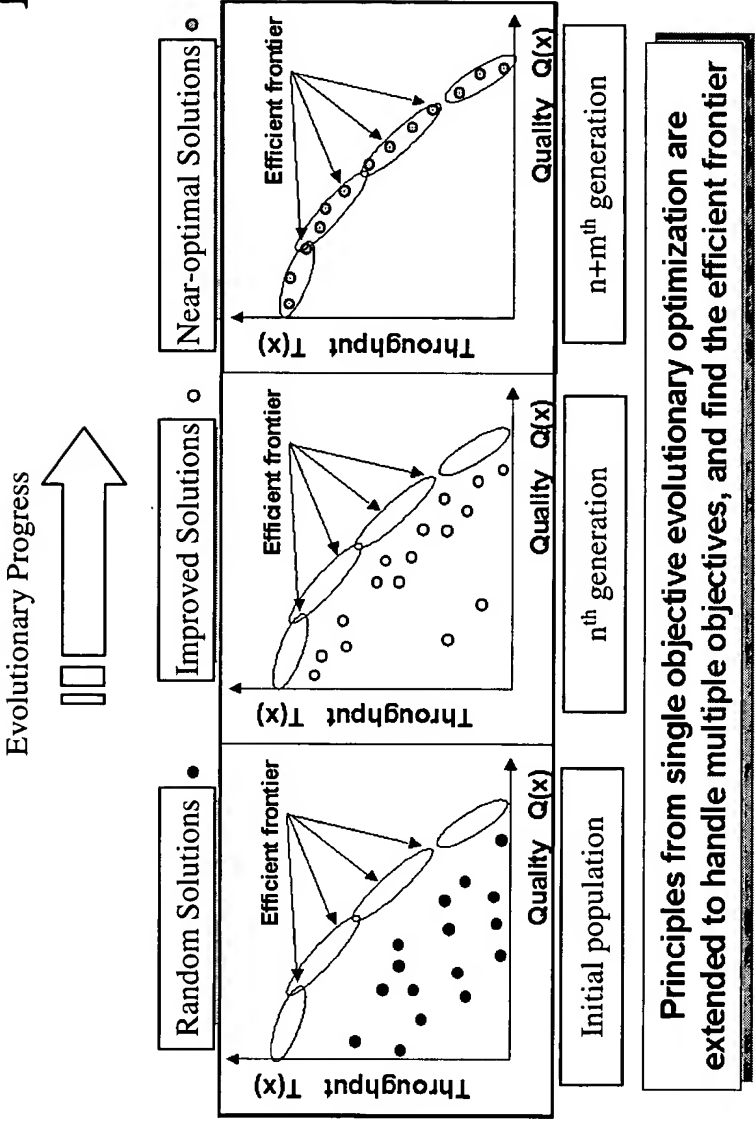


Fig. 5



Pareto Sorting Evolutionary Algorithm (PSEA)

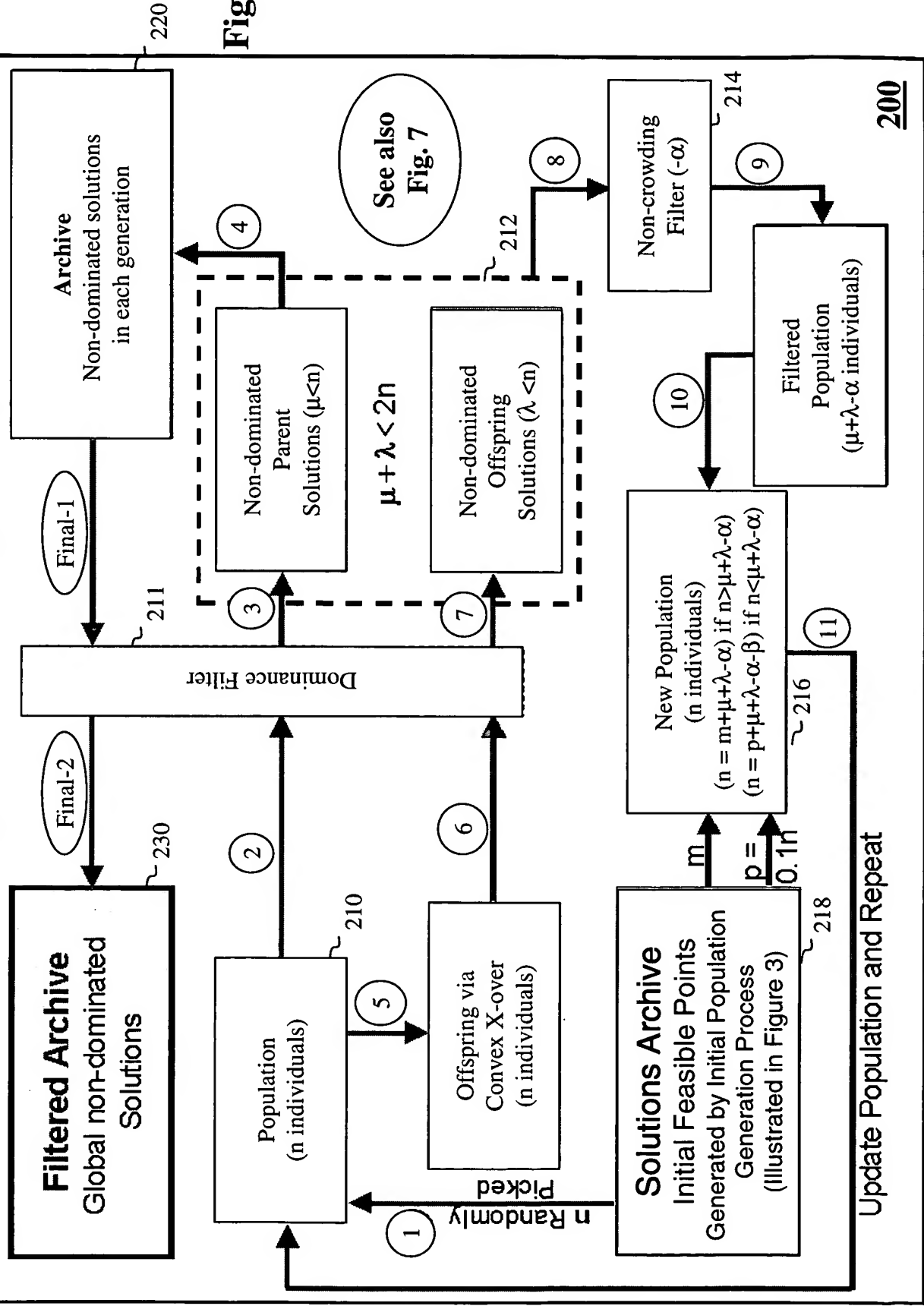


Fig. 6

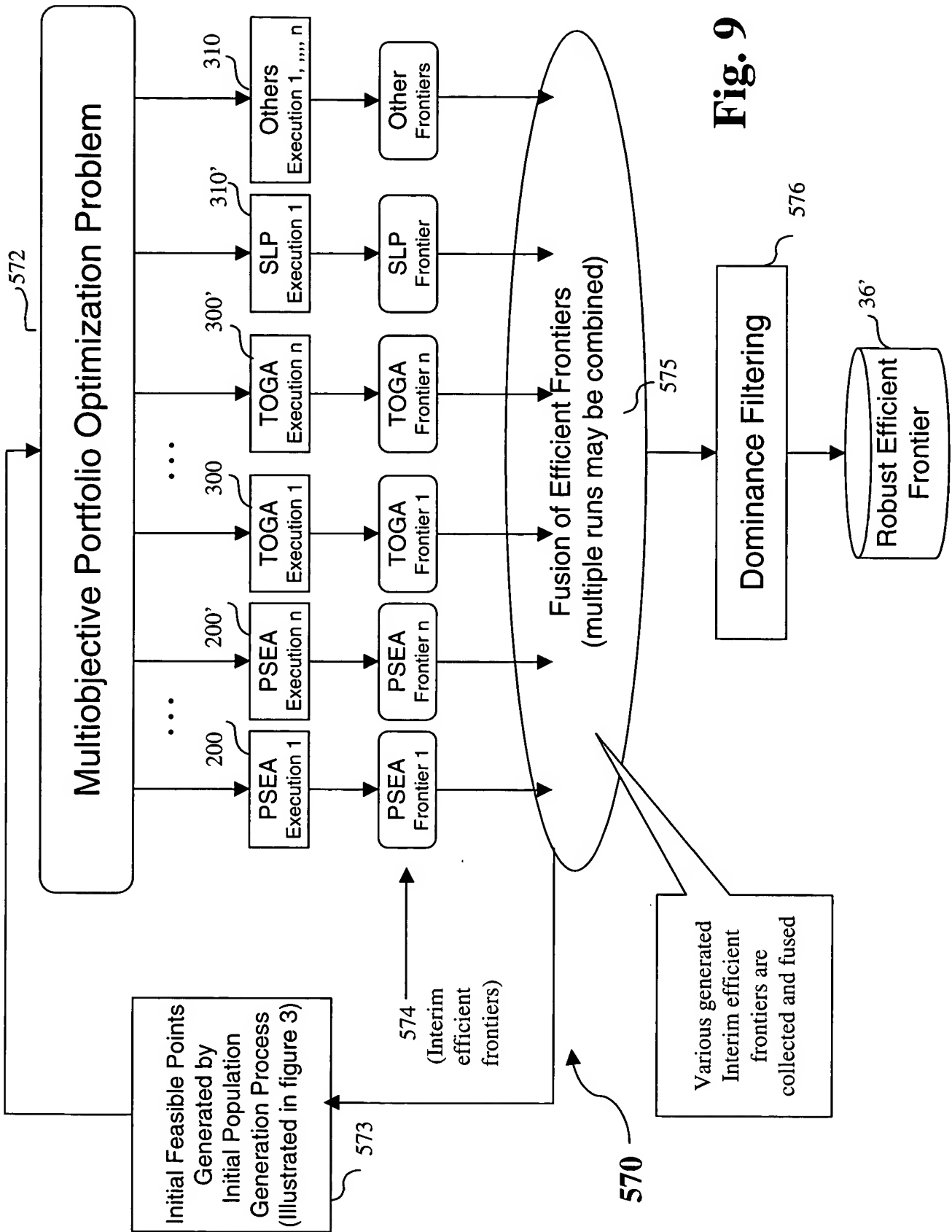
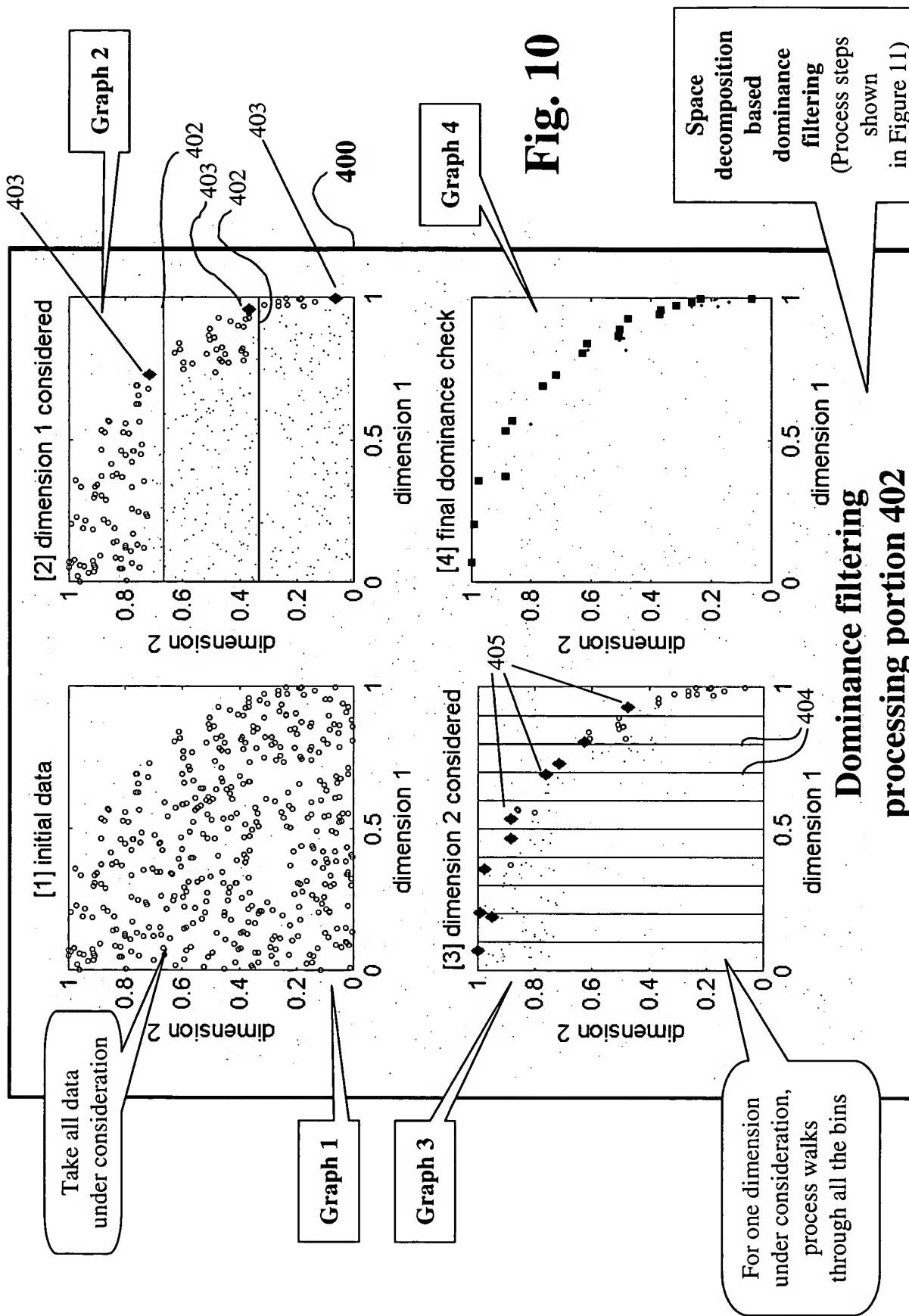


Fig. 9



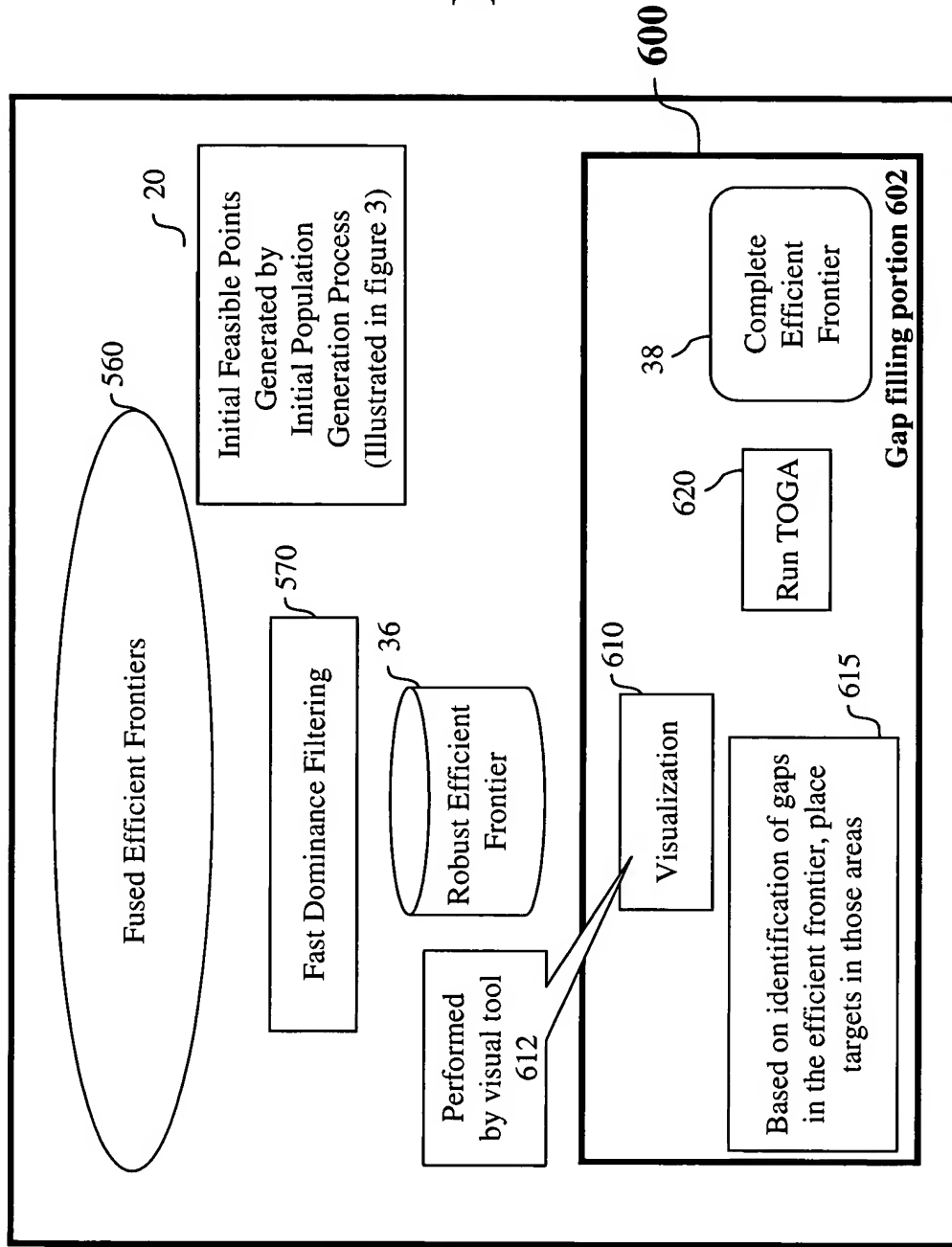


Fig. 12

Process to interactively fill any gaps in the identified efficient frontier

EXAMPLE OF PARALLEL COORDINATE PLOT

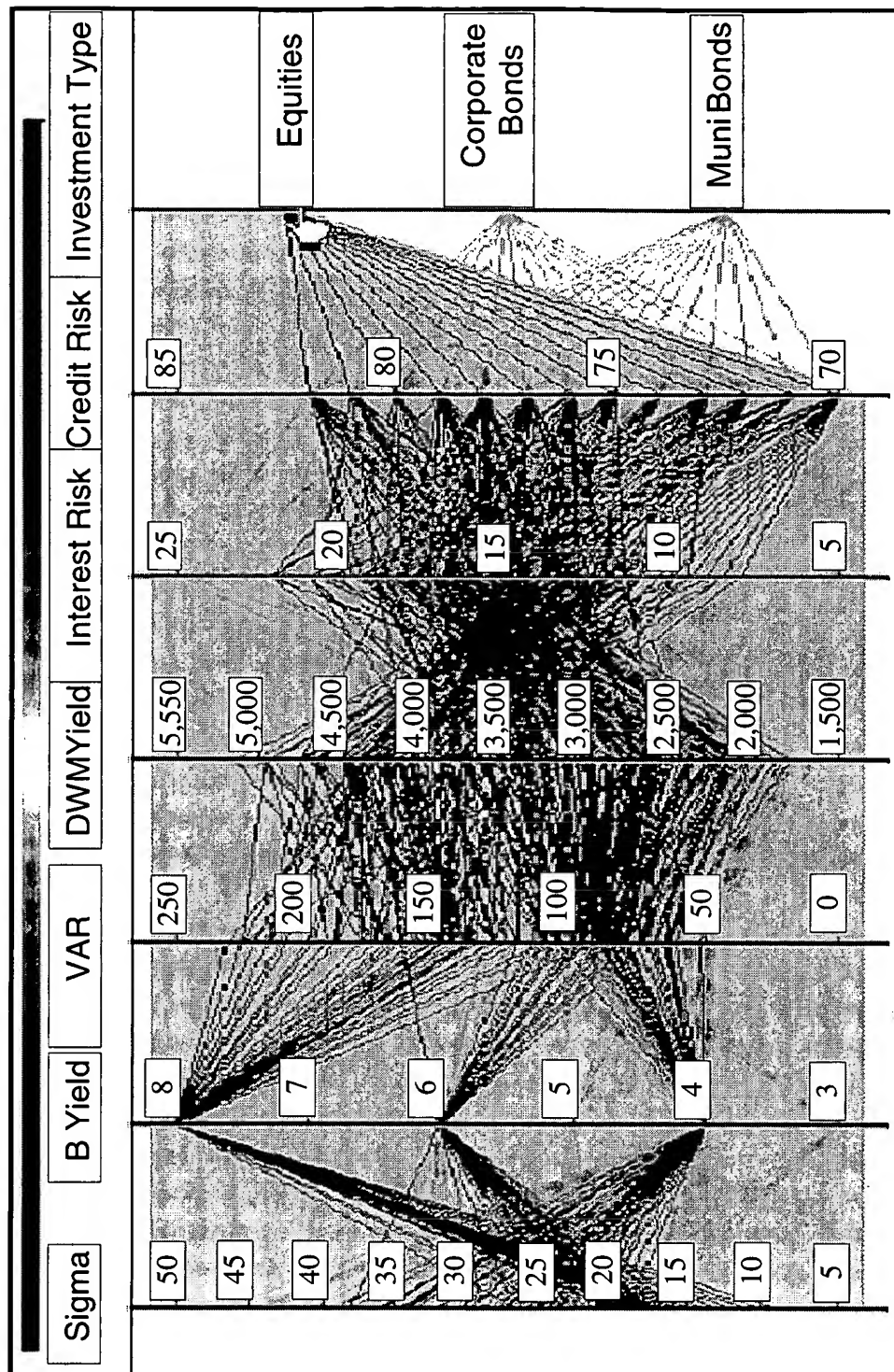


Fig. 14

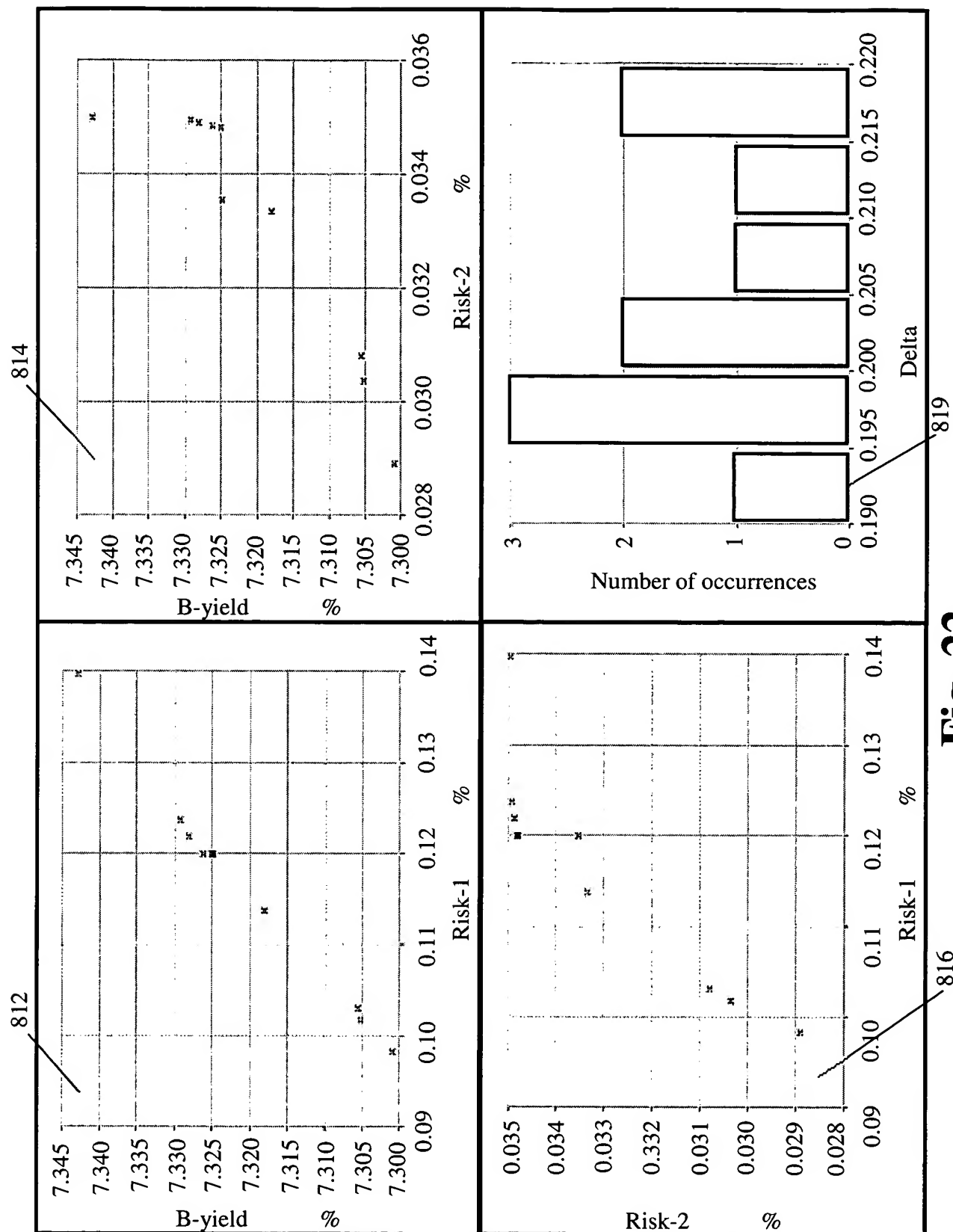


Fig. 22

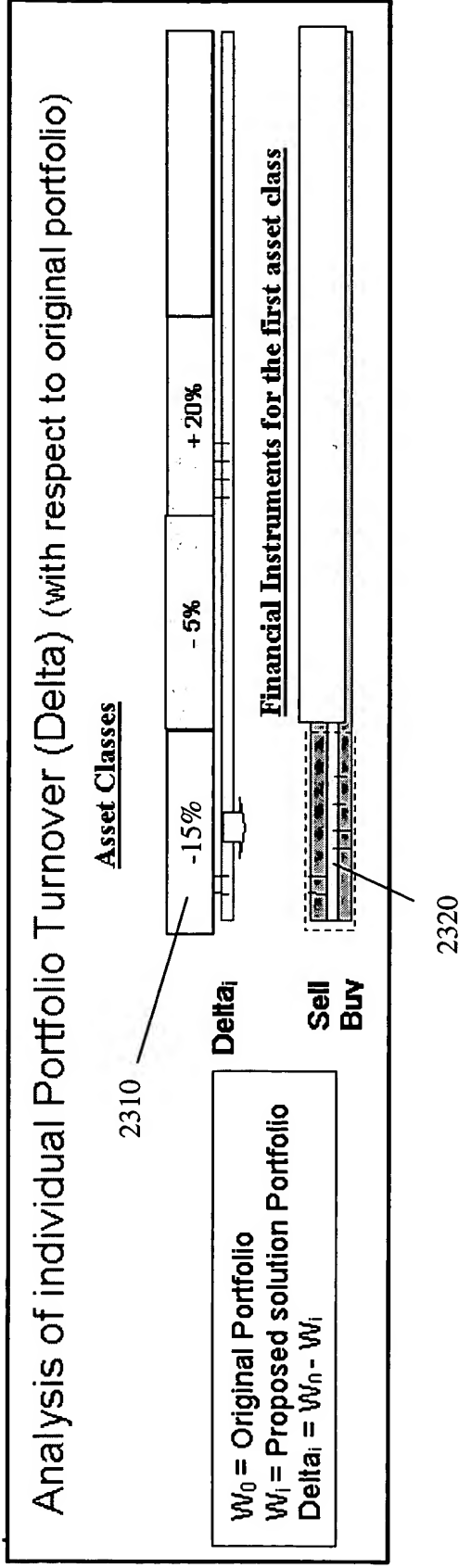


Fig. 23

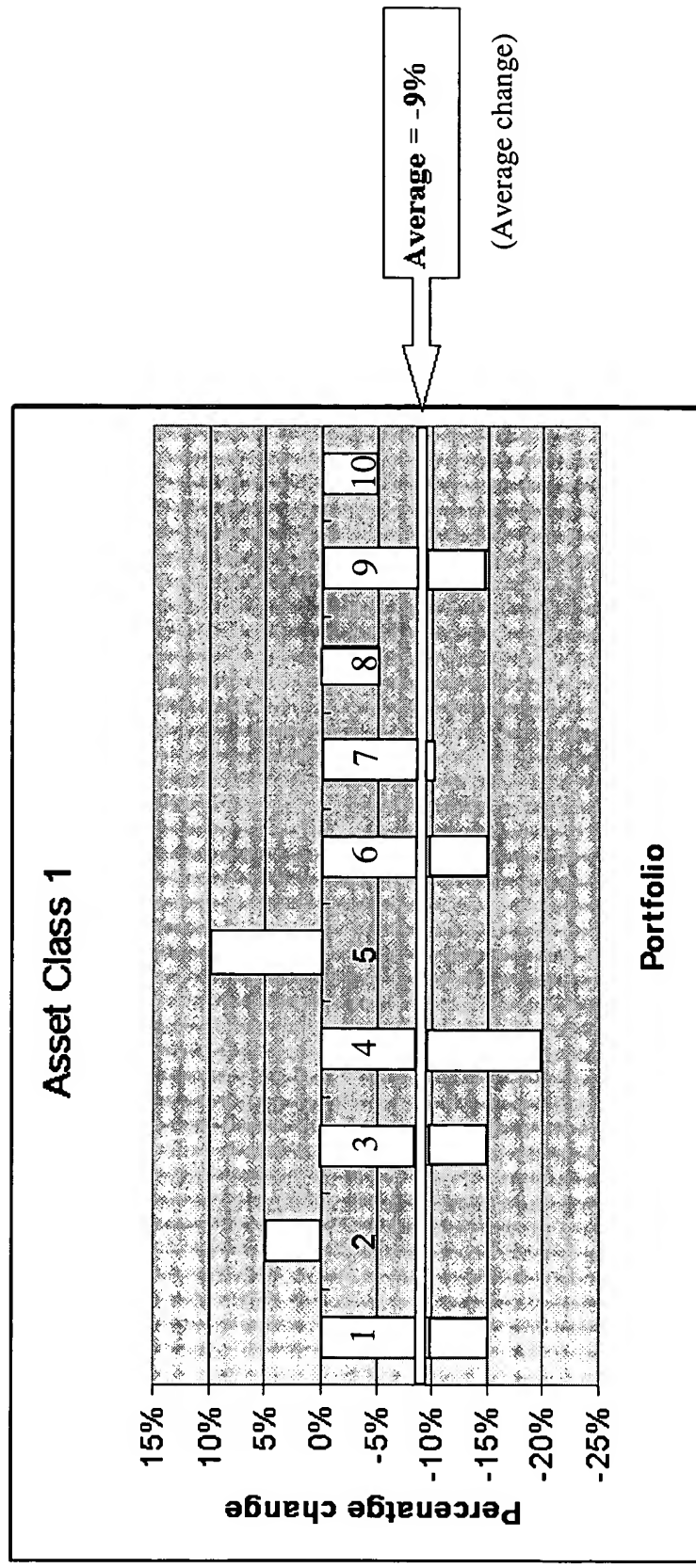


Fig. 26

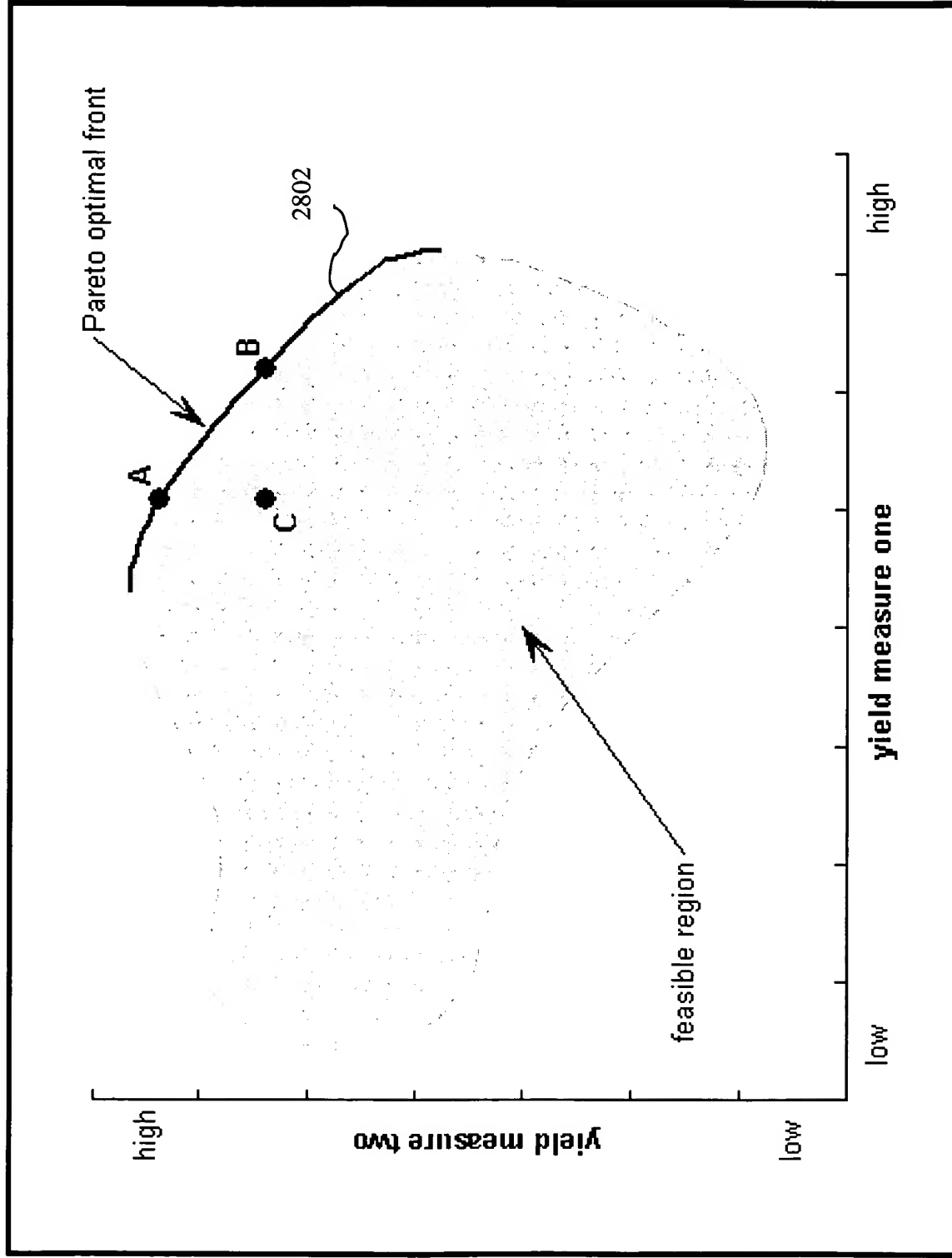
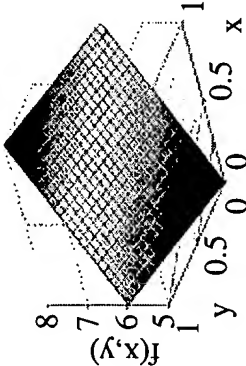
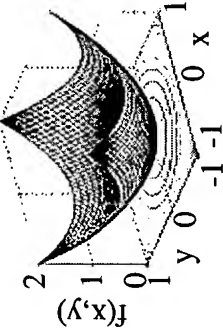
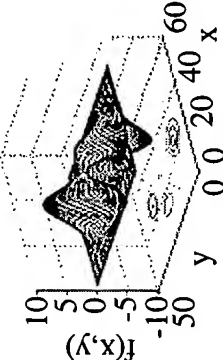


Fig. 28

Figure 34

Objective Functions

Graphic Visual	Word Description	Example Equation	GEAM
<div>Linear Function</div> 	<ul style="list-style-type: none"> • Function is defined using linear equations • Straightforward math relationship • Easy to optimize 	$f(x, y) = 2x + y + 5$	<ul style="list-style-type: none"> • Market value weighted yield • Duration weighted yield
<div>Nonlinear Convex Function</div> 	<ul style="list-style-type: none"> • Function is defined using a nonlinear equation • Functional gradients lead to single optimum • Harder to optimize 	$f(x, y) = x^2 + y^2$	<ul style="list-style-type: none"> • Interest rate sigma
<div>Nonlinear Nonconvex Function</div> 	<ul style="list-style-type: none"> • Function is defined using complex nonlinear equations • Multiple local optima • Functional gradients are inefficient • Very hard to optimize 	$f(x, y) = g_1(x, y) + g_2(x, y) + g_3(x, y) + g_4(x, y)$	<ul style="list-style-type: none"> • Interest rate sigma and VAR